DOCUMENT RESUME

ED 316 413 SE 051 240

TITLE Science Objectives for 1993-2000--Pacific Region Draft. DS Manual 2200.1.
INSTITUTION Dependents Schools (DOD), Washington, DC. Pacific Region.
PUB DATE Jan 90
NOTE 24p.
PUB TYPE Guides - Classroom Use - Guides (For Teachers) (052)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Biological Sciences; *Educational Objectives; *Elementary School Science; Elementary Secondary Education; *Physical Sciences; Process Education; Science Education; *Secondary School Science

ABSTRACT

This document is a guide for planning, development, implementation, and evaluation of the science education program within the Department of Defense (DoD) Dependent Schools System. It was developed by teachers, administrators, parents, and students from the perspective of what they wanted students to be like on high school graduation day as the result of science experiences received while attending DoD schools. The developers felt that science study in DoD schools should be hands-on and provide learners with a realistic and functional understanding of the world of science. Teachers are encouraged to use this guide as the focal point of their science program, realizing that textbooks and activities are aids to learning. The program is based on six major program strands including: develop positive attitudes; apply rational and creative thinking processes; demonstrate an awareness of the global significance of science and technology; acquire, comprehend, and apply scientific knowledge; utilize science experiences in planning a personal future; and use the language of science. Objectives are given for grades K-12. (CW)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

X This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

ED316413

Department of Defense Dependent Schools SCIENCE OBJECTIVES 1993–2000

SE 051 240

SCIENCE OBJECTIVES
FOR 1993-2000
PACIFIC REGION DRAFT

DS MANUAL 2200.1
January 1990

>----------<

FORWARD

Science Objectives for 1993-2000 is a guide for planning, development, implementation and evaluation of the science education program within the Department of Defense Dependent Schools System. The guide was developed by teachers, administrators, parents and students from the perspective of what they wanted students to be like on high school graduation day as a result of science experiences received while attending DoD Schools. The developers felt that science study in DoD Schools should be hands-on and provide learners with a realistic and functional understanding of the world of science in the 1990's. Also, the developers' opinions were that students graduating from DoD Schools should be scientifically literate people.

Teachers should use this guide as the focal point of their science program, realizing that textbooks, laboratory activities other hands-on science activities and the like are aids to learning. Consistent application of the major strands and objectives contained herein, therefore is essential to conduct a successful science program.

ACKNOWLEDGEMENTS

Science Objectives for 1993-2000 is the third in a series of curriculum objectives guides developed for use in Department of Defense Dependent Schools science education. Its predecessors were published in 1978 and 1984. The document is intended to replace the edition of DSM 2200.1 dated 1984. Rather than being a simple revision of the 1984 edition, this document was developed based upon the projection of where science was headed in the last decade of the 20th century, what scientifically literate high school graduates would need to cope effectively with the rapidly changing world of science and technology and finally, what type of science backgrounds might be expected of entering college students in the late 20th and early 21st century.

Science Objectives for 1993-2000 was developed by Department of Defense Dependent School System teachers, administrators, parents of students and high school students for use by the system in the following ways:

1. The focal point for science instruction, kindergarten through grade 12 in the schools of the system. All science lessons and other science activities in which students are involved should help foster conceptualization (on the part of students) of the objectives in this guide.

2. As a guide for use when selecting major learning aids like textbooks and laboratory materials for use in system schools.

3. As the basis for evaluating (testing) student success in the science programs at schools in the system. Students should be tested to ascertain whether they can demonstrate minimum levels of competency with the various objectives published in this guide.

ORGANIZATION AND USE OF THE GUIDE

The statements in this document define the science program in the Department of Defense Dependent Schools System. The document has been divided into two sections; kindergarten through grade six, and; grades seven through twelve. The sections differ somewhat in form based upon the perceptions of the writers about what form was most usable to classroom teachers at those two levels. The document is organized in a hierarchical system around the six major program strands. Those strands are:

I. **DEVELOP** a positive attitude toward all areas of science.

II. **DEVELOP** and **APPLY** through science experiences, rational and creative thinking processes for problem solving.

III. **DEMONSTRATE** an awareness of the significance and consequences of science and technology in a global society.

IV. **ACQUIRE, COMPREHEND,** and **APPLY** scientific knowledge--its concepts, theories, principles and laws.

V. **UTILIZE** science experiences in the planning and fulfillment of personal aspirations, career decisions and life styles.

VI. **USE** the language, instruments and materials of science for collecting, organizing and communicating information.

The major strands all have the same measure of importance and collectively define the science program. The objectives listed under each of the major strands collectively define that strand.

The guide is organized using the standard outline format:

I. Major Strand

A. Subcategory

B. Subcategory

1.

a.

b.

II. Major Strand

GRADES KINDERGARTEN - SIX

INTRODUCTION

The concepts and ideas of the American Academy for the Advancement of Science, Project 2061 were used as a basis for the goal statements which follow. Specifically, when considering the principles of learning, we need to understand that:

A. Learning is not necessarily an outcome of teaching.
B. What students learn is influenced by their existing ideas.
C. Teacher expectations affect performance.
D. Teaching methodology should be consistent with the nature of scientific inquiry.
E. Progression in learning is usually from the concrete level to the abstract.
F. Practicing enhances learning.
G. Effective learning by students requires feedback.

Each objectives should be prefaced with the statement, "Students should be able to....." All the objectives in this section apply to kindergarten through grade six.

I. **DEVELOP** a positive attitude towards all areas of science.

A. **DEMONSTRATE** an understanding about the beauty and orderliness in the sciences.

1. **SHOW** respect for living things.

2. **DEMONSTRATE** a continuing search for deeper understanding

3. **DISPLAY** confidence in ability to engage in scientific inquiry.

B. **QUESTION** natural phenomena.

1. **ACCEPT** the premise that scientific ideas are subject to change.

2. **RECOGNIZE** that science is a blend of logic and imagination.

3. **RECOGNIZE** the interrelationship among all objects and beings.

4. **VALUE** science's history and build on accumulated knowledge and understanding.

C. **COOPERATE** with others in science activities.

D. **STATE** the role of science in our world as it affects

mankind.

II. **DEVELOP** through science experiences rational and creative thinking processes for problem solving.

A. **PARTICIPATE** in science experiences.

1. **COOPERATE** with others in scientific inquiry.

2. **SEARCH** for data and their meaning.

3. **FORMULATE** testable hypotheses.

4. **INTERPRET** findings.

B. **FORMULATE** questions that can be answered by science activities.

1. **EXHIBIT** curiosity with objectivity and open-mindedness.

2. **SELECT** appropriate methods of measurement for data gathering.

3. **IDENTIFY** a variable(s) which is (are) controlled or held constant in an experiment.

4. **IDENTIFY** a variable(s) which is (are) deliberately changed in an experiment.

5. **STATE** the hypothesis or question being tested.

6. **DESIGN** a research plan to answer scientific questions.

7. **PREDICT** outcomes of the research plan.

C. **IMPLEMENT** the research plan to answer scientific questions.

1. **OBSERVE** objects and events by counting, comparing, estimating or measuring.

2. **GATHER** data to support stated hypothesis.

3. **DISTINGUISH** between relevant and irrelevant data.

4. **REPORT** observations of an object or an event in at least two ways (charts, graphs, tables, verbal, written narrative, etc.).

D. **EVALUATE** the research plan.

1. **STATE** the conclusions.

2. **FORMULATE** a revised hypothesis which fits new data.

3. **APPLY** research findings.

III. **DEMONSTRATE** an awareness of the significance and consequences of science and technology in a global society and beyond.

A. **STATE** the advantages and disadvantages of technology.

1. **ACCEPT** the premise that present technology is influenced by past technology.

2. **DETERMINE** that many technologies are interdependent.

3. **PREDICT** a sequence of consequences resulting from a scientific/technological change.

4. **LIST** benefits derived from technological innovations.

5. **IDENTIFY** concerns resulting from technological changes.

B. **DESCRIBE** how people are part of the environmental system.

1. **EXPLAIN** how technology is developed in response to society's needs.

2. **DETERMINE** that some technologies may not be developed because of the attitudes of society (nuclear power plants, genetic engineering etc.)

3. **RECOGNIZE** that there may be multiple solutions to complex technological problems (wood, coal, and nuclear sources for energy).

4. **KNOW** ways to personally preserve or improve the environment.

5. **PARTICIPATE** in activities that preserve or improve the environment.

6. **ACCEPT** that science and technology cannot solve all problems (health issues, taxes, crime, war).

IV. **DEMONSTRATE** scientific knowledge, concepts, theories, principles and laws to interpret the natural world.

A. **ACQUIRE** knowledge of the human organism.

1. **RECOGNIZE** basic similarities between humans and other living organisms.

2. **DIFFERENTIATE** between living and non-living organisms.

3. **DESCRIBE** the significance of the life cycle.

4. **LIST** the basic functions that are essential to a healthy body.

5. **DESCRIBE** the basic needs (food, water, shelter, clothing) for humans.

6. **STATE** the role genes play in human development.

7. **DESCRIBE** the human body's defenses against diseases.

8. **IDENTIFY** the causes of diseases.

9. **RECOGNIZE** the needs of people and how they influence their environment.

10. **DESCRIBE** the importance of mental health.

11. **STATE** that culture affects behavior.

B. **ACQUIRE** knowledge of the physical sciences their concepts, theories, principles, and laws.

1. **SHOW** that force is a push or a pull and can change an object's shape, speed or direction.

2. **GIVE** examples of physical forces.

3. **IDENTIFY** simple machines.

4. **STATE** that all machines are derived from simple machines.

5. **EXPLAIN** how simple machines change energy required to do work.

6. **STATE** that energy exists in various forms which may be changed from one form to another.

7. **RECOGNIZE** sources of energy (mechanical, electrical, heat, light, sound, magnetism, force, friction, motion, wind, geothermal, etc.) and their uses.

8. **DESCRIBE** the uses of solar energy and alternative sources of energy.

9. **IDENTIFY** devices that change energy from one form to another.

10. **IDENTIFY** the different forms of matter.

11. **DISCUSS** the various forms of matter.

12. **STATE** that matter can be changed.

C. **ACQUIRE** knowledge of the life sciences their concepts, theories, principles, and laws.

1. **IDENTIFY** the characteristics of living and non-living things.

2. **STATE** that living things can be grouped from the simplest to the complex.

3. **STATE** major functions of plants and animals.

4. **DESCRIBE** the physical changes occurring during life cycles of plants and animals.

5. **LIST** the basic needs of plants and animals.

6. **IDENTIFY** the basic needs of plants and animals.

7. **RECOGNIZE** the relationship between heredity and environment.

8. **DESCRIBE** how plants and animals adapt for survival.

D. **ACQUIRE** knowledge of the earth and space sciences their concepts, theories, principles, and laws.

1. **EXPLORE** the physical make-up and composition of the earth's land and water.

2. **IDENTIFY** the processes which change the earth's surface.

3. **DESCRIBE** the earth's atmosphere and how the changes occurring (for example, green house effect, holes in the ozone layer) affect life.

4. **DESCRIBE** global and local weather patterns in terms of rotation of the earth, topography and the movement of water and air masses.

5. **DISCUSS** the motions of stars, sun, planets.

6. **EXPLAIN** how the motions of celestial bodies affect us (days, seasons, tides, and asteroid/meteor impacts).

7. **DESCRIBE** scientific theories of the origin and evolution of the universe.

8. **EXPLORE** the principles of flight and space travel.

9. **DISCUSS** benefits obtained from the space exploration program.

V. **USE** science experiences in the planning and fulfillment of personal, career, and life style decisions.

A. **EXPLORE** careers in science and technology through the use of field trips, guest speakers, mentors, research models and other media.

B. **EXPLORE** job entry requirements of careers in science and technology.

C. **DESCRIBE** the importance of lifelong learning in a constantly changing society.

D. **DESCRIBE** how historical, cultural, political and economic conditions influence choice in a technological society.

VI. **USE** the language, instruments and materials of science for collecting, organizing, applying and communicating information.

A. **STATE** that science experiments are both replicable and universal.

1. **UTILIZE** tools and models appropriate to the phenomenon being studied.

2. **OBSERVE** an object or event using one or more of the five senses.

3. **GATHER** data by counting, comparing, estimating, or measuring in metric units.

4. **DESCRIBE** observable and measurable changes (position, size, shape temperature, small, color, etc.).

5. **REPORT** observations of an object or event in at least two ways (charts, graphs, tables etc.).

6. **REQUIRE** verification of data.

B. **USE** computers as tools for gathering, processing or manipulating data and communicating information.

GRADES SEVEN - TWELVE

INTRODUCTION

The objectives in this section apply to all grades seven through twelve. Except as noted below in objective "F" under major strand IV subjects and courses have been omitted. The courses, whatever their titles, that students take as they progress from grade seven to twelve are the vehicles that help them to gain minimum competence with the objectives in this section. Describing the role of people in the ecosystem, for example, can be embraced in life science, biology, chemistry (environmental), science technology and society and so on.

All courses listed in "IV.D.," are described in the science and regional supplement sections of the Department of Defense Dependent Schools, Learning and Course Description Standards Guide.

I. **DEVELOP** a positive attitude towards all areas of Science.

   A. **USE** hands on experimentation, discovery and inquiry.

   B. **ENGAGE** in activities that improve and conserve the physical and natural environment.

   C. **SEEK** alternative approaches to solving science problems.

   D. **PARTICIPATE** in science fairs, expos, and " Odessey of the Mind" to enhance classroom knowledge.

II. **DEVELOP** and **APPLY** through science experiences, rational and creative thinking processes for problem solving.

   A. **STATE** a problem.

   B. **DEVELOP** a sequential method for problem solving.

   C. **MAKE** predictions based on measurements and graphs.

   D. **IDENTIFY** an hypothesis.

   E. **FORMULATE** a hypothesis.

   F. **IDENTIFY** variables and controls in experiments.

   G. **DISTINGUISH** between observations and inference.

   H. **USE** the appropriate method of measurement.

   I. **EVALUATE** the reliability of a prediction.

   J. **DISPLAY** skepticism of unsubstantiated conclusions.

III. **DEMONSTRATE** an awareness of the significance and consequences of science and technology in a global society.

A. **EXPLORE** social, technical, and economic concepts of technology.

B. **DISCUSS** interaction of technology and science.

C. **GIVE** examples of cause and effect relationships.

D. **NAME** science related behaviors that are important for citizens.

E. **GIVE** examples of interactions of scientists and society throughout history.

F. **DESCRIBE** the role of people as part of the ecosystem.

G. **PARTICIPATE** in activities that conserve and improve the environment.

H. **LIST** benefits and concerns which have resulted from scientific/technological innovations.

I. **PREDICT** a sequence of consequences resulting from a scientific/technological change.

J. **DESCRIBE** how cultural, political, and economic conditions influence technological choices.

K. **DESCRIBE** ways to conserve or preserve the natural and man-made environment.

L. **CLASSIFY** factors affecting a decision about a science related concern as scientific, economic, or political.

M. **DESCRIBE** how cultural, political, and economic conditions influence technological choices.

N. **ANALYZE** pros and cons of a scientific/technological innovation.

O. **DISCUSS** limits on the uses of natural environments.

IV. **ACQUIRE, COMPREHEND** and, **APPLY** scientific knowledge - its concepts, theories, principles and laws.

A. **ANSWER** a scientific question by collecting and examining data through direct experience.

B. **EVALUATE** the use of mental or computer models to explain the phenomena.

C. **IDENTIFY** the role of probability and chance in cause and effect situations.

D. **DEMONSTRATE** a continuous search for deeper understanding.

E. **DIFFERENTIATE** among materials which can be reused, renewed and/or recycled.

F. **DEMONSTRATE** the scientific information gained through the following studies:

1. Life Science (seventh grade)

   a. **OBSERVE** objects and events by counting, comparing, estimating, or measuring.

   b. **DESCRIBE** adaptations of plants and animals to their environment.

   c. **DESCRIBE** different types of growth, development, reproduction, and life cycles in plants and animals, including humans.

   d. **DESCRIBE** the principles of evolution and heredity.

   e. **IDENTIFY** causes of disease (e.g. pathogens, stress, deficiencies, radiation, toxins, and genetics).

   f. **OUTLINE** principal factors that may limit population size and distribution of plants and animals, including humans.

   g. **SELECT** ways to conserve natural and man-made environments.

   h. **DESCRIBE** classic plant and animal structures and how they are used in classification.

   i. **DESCRIBE** the cell theory and mechanics, and how it relates to tissues, organs, and systems.

   j. **EXPLAIN** requirements for photosynthesis and respiration.

   k. **DESCRIBE** classic structure and function of protists, fungi, and monerans.

2. Earth Science (eighth grade)

   a. **DESCRIBE** principles of map reading as they pertain to the physical surfaces of the world, other planets, and satellites.

   b. **DESCRIBE** earth composition and structure.

   c. **IDENTIFY** renewable and nonrenewable natural energy resources found in the earth's environment.

d. **DESCRIBE** global and local weather patterns in terms of rotation of the earth, topography, and the movement of water and air mass.

e. **EXPLAIN** how the motion of heavenly bodies affects us, e.g., days, seasons, tides, and asteroid/meteor impacts.

f. **DESCRIBE** scientific theory of origin and evolution of the universe.

g. **IDENTIFY** and **CLASSIFY** igneous, metamorphic, sedimentary rocks, and minerals.

h. **DESCRIBE** the composition, topography, and water cycles of oceans.

i. **DESCRIBE** the changing of the earth as related to erosion, glaciation, and plate tectonics.

j. **DISCUSS** benefits derived from space exploration.

k. **LIST** benefits and concerns which have resulted from scientific/technological innovations.

l. **DESCRIBE** the nature of an atom and its role in the composition of matter and mass.

3. Physical Science

a. **DESCRIBE** the properties and interactions of matter and energy.

b. **IDENTIFY** the similarities and differences among solids, liquids, and gases.

c. **GIVE** evidence for the particle nature of matter.

d. **IDENTIFY** matter by its physical nature and chemical characteristics.

e. **RELATE** force, motion, energy, and power.

f. **DESCRIBE** behavior of different forms of energy.

g. **PREDICT** a series of consequences from a scientific/technological change.

h. **DEVELOP** a systematic approach to laboratory work and scientific study.

i. **STATE** the importance of careful observations and procedures to obtain valid results.

j. EXPLAIN the periodic table in terms of construction and use.

k. DESCRIBE the nature, workings, and ramifications of nuclear energy.

l. STATE that light, sound, heat, electricity, and magnetism are forms of energy.

4. Biology I

a. DESCRIBE the chemical and structural basis of life.

b. DESCRIBE anatomy, physiology, and behavior of representative life forms.

c. DESCRIBE principles of evolution and heredity.

d. IDENTIFY sources of energy for living things.

e. DESCRIBE the role of biochemical cycles in nature.

f. EXPLAIN the requirements of photosynthesis and respiration.

g. EXPLAIN interactions of individuals and groups in living systems.

5. Chemistry I

a. EXPLAIN solutions and solubility.

b. USE the periodic table of the elements.

c. EMPLOY chemical bonding theory.

d. DISCUSS ionization energy and electron energy levels explaining chemical characteristics.

e. PREDICT rates of reaction.

f. DESCRIBE equilibrium and equilibrium factors.

g. RECOGNIZE acids, bases, and salts.

h. DESCRIBE oxidation reduction chemical reactions.

i. DESCRIBE carbon compounds and reactions.

6. Physics I

a. DESCRIBE nature and the interactions of matter

and energy and relativity theory.

b. **APPLY** the concepts of force, motion, and energy.

c. **DESCRIBE** major energy transformations, including radioactivity.

d. **DEFINE** heat, light, and sound.

e. **DESCRIBE** competition of ideas between earth-centered and sun-centered astronomy.

f. **DISCUSS** change from classical to quantum mechanics.

g. **DISCUSS** magnetic, static, and current electricity.

h. **DESCRIBE** interactions between electricity and magnetism and the role of electromagnetic wave motion.

i. **DESCRIBE** the electronics of basic technology and current communications.

j. **GIVE** evidence of the particle nature of matter.

7. Biology II

a. **APPLY** different problem-solving strategies in the life sciences.

b. **EMPLOY** proper procedures for collecting, organizing, analyzing, and communicating raw data.

c. **USE** special techniques in the laboratory.

d. **USE** special equipment and instruments unique to biological studies.

e. **IDENTIFY** legal, humanistic, and social issues affecting immediate and global environments.

f. **PRESENT** results of experimental activity, using one or more media, oral communicationS, and the techniques of acceptable scientific writing.

8. Chemistry II

a. **APPLY** different problem-solving strategies in the chemical sciences.

b. **EMPLOY** proper procedures for collecting, organizing, analyzing, and communicating raw data.

c. **USE** special techniques in the laboratory.

d. **USE** special equipment and instruments unique to chemical studies.

e. **IDENTIFY** legal, humanistic, and social issues affecting immediate and global environment.

f. **PREPARE** and present results of experimental activity, using one or more media, oral communication, and the techniques of acceptable scientific writing.

9. Physiology

a. **APPLY** different problem-solving strategies.

b. **EMPLOY** proper procedures for collecting, organizing, analyzing, and communicating raw data.

c. **USE** special techniques in the laboratory.

d. **USE** special equipment and instruments unique to physiological studies.

e. **IDENTIFY** legal, humanistic, and social issues affecting immediate and global environments.

f. **PRESENT** results of experimental activity, using one or more media, oral communication, and techniques of acceptable scientific writing.

10. Physics II

a. **APPLY** different problem-solving strategies in the physical sciences.

b. **EMPLOY** proper procedures for collecting, organizing, analyzing, and communicating raw data.

c. **USE** special techniques in the laboratory.

d. **USE** special equipment and instructions unique to the study of physics.

e. **IDENTIFY** legal, humanistic, and social issues affecting immediate and global environments.

f. **PRESENT** results of experimental activity, using one or more media, oral communication, and the techniques of acceptable scientific writing.

11. Science-Technology-Society

a. **DESCRIBE** the enterprise of scientific inquiry in the context of contemporary problems in the various disciplines of science, technology,and the social sciences.

b. **ACQUIRE** relevant information to make responsible decisions.

c. **ACQUIRE** inquiry skills that one would use as a scientist, technologist, or scientifically literate citizen.

d. **DISCUSS** science-related options and consequences.

12. Scientific Research

a. **EXAMINE** current research published in newspapers and journals.

b. **IDENTIFY** an area of interest of A group.

c. **CONDUCT** a study in a group.

d. **REPORT** the study individually in a written format, including an introduction, background research, methods and procedures, results, conclusions, and a reference list.

e. **IDENTIFY** an individual area of interest.

f. **RESEARCH** an individual area of interest, designing an original study.

g. **WRITE** a proposal that includes an introduction, background research, methods and procedures, and a reference list.

13. Astronomy

a. **RELATE** mass, temperature, age, and pressure to cycles.

b. **DESCRIBE** the location of and the relation among the planets, stars, and galaxy.

c. **RELATE** location to the planet orbital period.

14. Oceanography

a. **DESCRIBE** how information is acquired through observations and measurements of marine phenomena.

b. **DEMONSTRATE** a manifestation of the critical thinking skills by solving marine physical, biological, and chemical problems.

c. **DESCRIBE** the structure, function, and behavior of representative marine life forms, especially in the planktonic community.

d. **DESCRIBE** interactions among physical, biological, and chemical events occurring in the various marine environments.

e. **IDENTIFY** and describe major energy sources and interactions in the marine environment.

f. **ANALYZE** current issues in marine science and technology.

g. **DESCRIBE** the impact of current marine-oriented issues on man.

h. **DESCRIBE** the structure of the world ocean and its basin.

15. Marine Biology

a. **DESCRIBE** how information is acquired through observations and measurements of marine phenomena.

b. **DEMONSTRATE** a manifestation of critical thinking skills by solving marine biological-oriented problems.

c. **DESCRIBE** the structure. function, and behavior of representative marine life forms.

d. **DESCRIBE** interactions between physical and biological events occurring in the marine environments.

e. **IDENTIFY** and describe major energy transformations in the marine environment.

f. **ANALYZE** current issues in marine science and technology.

g. **DESCRIBE** the impact of current marine-oriented issues on human and other populations.

V. **UTILIZE** science experience in the planning and fulfillment of personal aspirations, career decisions and life styles.

A. **IDENTIFY** potential careers and required course work to attain that career.

B. **EXPLORE** job entry requirements of careers and science and technology.

C. **IDENTIFY** activities of people who work in science.

D. **EMPHASIZE** the need for life long learning and science's impact on a changing society.

VI . **USE** the language, instruments and materials of science for collecting, organizing and communicating information.

A. **WRITE** and verbalize a report on scientific information.

B. **DEVELOP** a logical line of reasoning in support of a solution.

C. **DEVELOP** methods of research, documentation, analyzing and organizing data into a formal format.

D. **DEMONSTRATE** familiarity with the theory and safe operation of scientific instruments.

E. **DEMONSTRATE** a proficiency with computers and associated software.

F. **REPORT** observations of an object or event in at least two ways (charts, graphs, tables, verbal, written, etc.).

G. **DISCUSS** the possibility for error in any measurement.

H. **SELECT** tools appropriate to the phenomenon being studied.

I. **ANSWER** a scientific question by collecting and examining data through direct experience.

J. **IDENTIFY** properties useful for classifying objects.

K. **EVALUATE** the presentation of a research project.

L. **DISTINGUISH** between scientific and non-scientific explanations of phenomena.

M. **DESIGN** research to answer a scientific question.

N. **PRESENT** a research project.

O. **RECOGNIZE** the limitations of a study.

SCIENCE EDUCATION TASK GROUPS

1. OKINAWA

NAME	SCHOOL	STATUS
Lucy Fernandez	Stearley Heights Elementary School	Teacher, First Grade
Gloria Mc Kearney	Bechtel Elementary School	Parent
Karen Arceneaux	Bob Hope Primary School	Teacher, Second
Marilyn Williams	Zukera.. Elementary School	Teacher, Third Grade
Betsy Kalny	Kinser Elementary School	Teacher, Fourth Grade
Wallace Waterstreet	Bechtel Elementary School	Teacher, Fifth Grade
Matthew Johnson	Amelia Earhart Intermediate School	Teacher, Sixth Grade
Hattie Phipps	Kinser Elementary School	Assistant Principal
Lee Howe	Kubasaki High School	Teacher, Science
Ray Esack	Kadena High School	Teacher, Science
Margaret Reischl	Kadena Elementary School	Teacher, Kindergarten
Garrett Billington	Kadena High School	Teacher, Science
Kitty Tyler	Kadena Elementary School	Parent
Cheryl Aellio	Kadena High School	Parent
Heather Fleniken	Kubasaki High School	Student

2. KOREA

NAME	SCHOOL	STATUS
Sarah Yoshida	Seoul American Elementary School	Teacher, First Grade
Kathy Johnson	Seoul American Elementary School	Teacher, Fifth Grade
Lynne McDermott	Seoul American Elementary School	Teacher, Fifth Grade
Susan Hawes	Osan Elementary School	Teacher, Second Grade
Ralph Babcock	Seoul American High School	Teacher, Science
Mary Ann Babcock	Seoul American High School	Teacher, Science
Darrell Guthmiller	Taegu American School	Teacher, Science
John Thomas	Pusan American School	Teacher, Science
Shelly Kennedy	Pusan American School	Teacher, Fifth Grade
Earl Ficken	C. T. Elementary School	Principal and Kindergarten Teacher
Cindy Sinn	Osan Elementary School	Teacher, Fourth Grade

3. JAPAN

NAME	SCHOOL	STATUS
Lee Forrest	Zama High School	Teacher, Science
Ester Golde	Arnn Elementary School	Teacher, Third Grade
Sharon Muneno	Arnn Elementary School	Teacher, Third Grade
Francis Hammond	M. C. Perry Elementary School	Teacher, Fourth Grade
Louise Kasanuki	Yokota East Elementary School	Teacher, Kindergarten
James Price	Zama Middle School	Teacher, Science
Herman Radick	Yokota High School	Teacher, Science
Charles Weber	Yokota High School	Teacher, Science
Jan Castro	Yokota West Elementary School	Teacher, First Grade
Lisa Unger	Yokota East Elementary School	Teacher, Fifth Grade
Gin Russell	Sollars Elementary School	Teacher, Sixth Grade
James Fisher	Shirley Lanham Elementary School	Assistant, Principal

4. PACIFIC REGION

NAME	SCHOOL	STATUS
Kitty Tyler	Kadena Elementary School	Parent
Karen Arceneaux	Bob Hope Primary School	Teacher, Second Grade
Jed Bernstein	Bob Hope Primary School	Teacher, Tag
Hattie Phipps	Kinser Elementary School	Assistant Principal
Sarah Yoshida	Seoul American Elementary School	Teacher, First Grade
David Sayler	Lily Hill Middle School	Teacher, Science
Timothy Connors	Kinnick High School	Teacher, Science